

CLAIMS

What is claimed is:

- 1 1. A magnetoresistive sensor comprising:
 - 2 first and second magnetically free layers;
 - 3 a magnetically pinned layer sandwiched between the first and second free layers,
 - 4 said magnetically pinned layer being self pinned;
 - 5 a first electrically insulating barrier layer sandwiched between said first
 - 6 magnetically free layer and said pinned layer; and
 - 7 a second electrically insulating barrier layer sandwiched between said second free
 - 8 layer and said pinned layer.
- 1 2. A magnetoresistive sensor as in claim 1 wherein said pinned layer is pinned by a combination of magnetostriction of the pinned layer and compressive stress within the sensor.
- 1 3. A magnetoresistive sensor as in claim 1 wherein said pinned layer comprises Co and Fe, wherein the atomic percent of Fe is about 50%.
- 1 4. A magnetoresistive sensor as in claim 1 wherein said pinned layer comprises CoFe with an atomic percent of Fe ranging from 20 to 60 percent.

1 5. A magnetoresistive sensor as in claim 1 wherein said pinned layer comprises
2 CoFeV, with an atomic percent of Fe ranging from 20 to 60 percent and an atomic
3 percent of V ranging from 2 to 10 percent.

1

1 6. A magnetoresistive sensor as in claim 1 wherein said pinned layer comprises a
2 single ferromagnetic layer comprising Co and Fe.

1

1 7. A magnetoresistive sensor as in claim 1 wherein said pinned layer comprises a
2 single ferromagnetic layer comprising Co, Fe and V.

1 8. A magnetoresistive sensor as in claim 1 wherein said pinned layer comprises three
2 ferromagnetic layers separated by first and second non-magnetic coupling layers.

1 9. A magnetoresistive sensor as in claim 8, wherein said three ferromagnetic layers
2 comprise Co and Fe and wherein the atomic percent of Fe in each layer is 20 to 60
3 percent.

1 10. A magnetoresistive sensor as in claim 8, wherein said three ferromagnetic layers
2 comprise Co, Fe and V and wherein the percentage of Fe in each layer ranges from 20 to
3 60 percent and wherein the atomic percentage of V ranges from 2 to 10 percent.

1 11. A magnetoresistive sensor as in claim 1, wherein said pinned layer comprises first
2 two outer ferromagnetic layers and one inner ferromagnetic layers, the outer and inner
3 ferromagnetic layers comprising Co and Fe, said outer ferromagnetic layers having a
4 thickness of about 5 angstroms and said inner ferromagnetic layer having a thickness of
5 about 10 angstroms.

1 12. A magnetoresistive sensor as in claim 1, wherein said pinned layer comprises a
2 single layer of ferromagnetic material comprising Co and Fe and wherein said
3 single ferromagnetic layer has a thickness of 5 to 15 angstroms.

1 13. A magnetoresistive sensor as in claim 1, wherein said barrier layers comprise
2 Aluminum Oxide.

1 14. A magnetoresistive sensor as in claim 1, wherein said barrier layers comprise
2 magnesium oxide.

1 15. A magnetoresistive sensor as in claim 1, wherein at least one of said free layers
2 comprises CoFe.

1 16. A magnetoresistive sensor as in claim 1, wherein at least one of said free layers
2 comprises a layer of CoFe and a layer of NiFe, the CoFe layer being disposed
3 closer to the pinned layer than the NiFe layer.

1 17. A magnetoresistive sensor as in claim 11, wherein said three ferromagnetic layer
2 of said pinned layer are separated from one another by first and second non-magnetic
3 coupling layers.

1 18. A magnetoresistive sensor as in claim 11, wherein said three ferromagnetic layers
2 of said pinned layers are separated from one another by first and second non-
3 magnetic coupling layers comprising Ru.

1 19. A magnetic data storage system, comprising:
2 a motor;
3 a magnetic disk rotatably connected with said motor;
4 a suspension;
5 a slider connected with said suspension for movement adjacent to said disk;
6 a magnetoresistive sensor, connected with said suspension, said magnetoresistive
7 sensor further comprising:
8 first and second magnetically free layers;
9 a magnetically pinned layer sandwiched between the first and second free
10 layers, said magnetically pinned layer being self pinned;
11 a first electrically insulating barrier layer sandwiched between said first
12 magnetically free layer and said pinned layer; and
13 a second electrically insulating barrier layer sandwiched between said
14 second free layer and said pinned layer.